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ABSTRACT OF THE DISCLOSURE

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A semiconductor manufacturing process is disclosed that may form a contact structure with a tungsten plug. A contact structure hole may be adequately filled with tungsten, while avoiding plug loss, increased resistance and/or trenching, that can result from conventional approaches. According to one particular embodiment, a titanium film (003) may be deposited with an anisotropic sputtering method, such as an ion metal plasma method, or the like. A titanium film (003) may have a thickness outside a contact hole (020) that is 100 nm or more. However, due to anisotropic sputtering, a titanium film (003) within a contact hole (020) may be thinner than outside the contact hole (020). A contact hole (020) may then be filled with a tungsten film (005). A tungsten film (005) and titanium film (003) may then be etched back leaving a tungsten plug having shape with an upwardly projecting portion.